

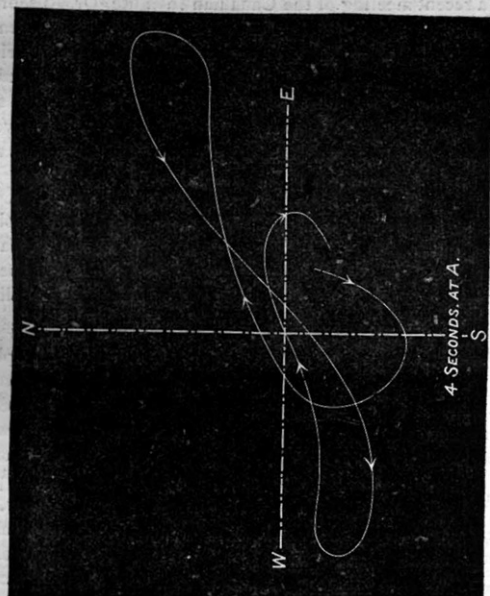
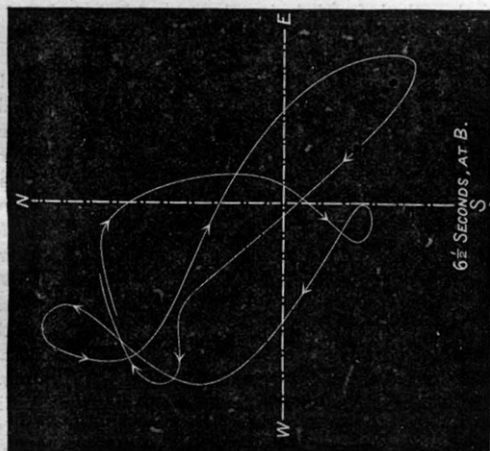
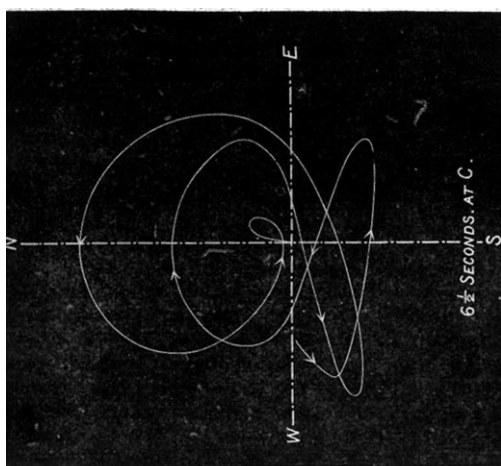


FIG. 2.—Compounded Horizontal Motion.

horizontal motion has been compounded during intervals of 4, 6½, and 6½ seconds respectively: the results are shown to a magnified scale in Fig. 2, and illustrate well the complex character of earthquake motion. The greatest extent of horizontal motion is from one to the other extremity of the figure-of-eight in the first of these diagrams: its actual amount (on the ground) was 7·5 millimetres. The greatest vertical motion was 1·5 millimetres. Other records obtained by Prof. Sekiya lead him to conclude that the greatest vertical motion in Tokio earthquakes is about one-sixth of the greatest horizontal motion. In former examples published by the writer the record was in all cases taken on the soft alluvial soil on which the greater part of the city of Tokio is built. In this instance the record was taken (at the site of the new University buildings, Kaga Yashiki, Hongo) on the much harder ground which here and there rises above the alluvial plain. From a comparison of records taken at the old and the new sites of the Seismological Observatory, Prof. Sekiya concludes that the motion of the alluvial plain is generally greater than that of the higher and stiffer soil in the ratio of two or three to one.

J. A. EWING.

NOTES.

ON Tuesday, Congregation at Oxford declined, by a majority of 106 votes to 60, to sanction the lending of books or manuscripts from the Bodleian Library. This decision is, no doubt, greatly regretted by a number of resident graduates, but it has the cordial approval of most other persons. Had the proposed change been made, it is certain that sooner or later many valuable books and manuscripts would have been lost or injured, and scholars would constantly have found that the works they wanted were "out." It would have been a serious mistake to transform one of the most magnificent collections of books in the world into a lending-library for the benefit of a small class of students.

IN celebration of the fiftieth anniversary of Her Majesty's reign, the general meeting of the Zoological Society of London on June 16 will be held, at 4 p.m., in the Society's Gardens on the lawn, which will be reserved for this occasion. After the usual formal business, the silver medal awarded to the Maharajah of Kuch-Bihar will be delivered to His Highness. The President will then give a short address on the progress of the Society during the past fifty years. After the conclusion of the general meeting, the President and Council will hold a reception of the Fellows of the Society and other invited guests.

THE new University of Upsala was opened with great ceremony on May 17. There were present the King and Crown Prince of Sweden, a number of delegates from foreign Universities, the leading Swedish men of science, and some 1500 students. The building is very handsome, and has cost nearly £250,000.

IN the Report of the Royal University of Ireland for 1886, just issued as a Parliamentary Paper, it is stated that last year 2933 persons presented themselves at the various examinations, an increase of 43 on the previous year. The degree of Bachelor of Arts was conferred on 9 women, of whom 4 took honours. One lady was admitted to the degree of Master of Arts, and another, Miss Mary Story, obtained the first place in the first-class honours in modern literature, and won a first-class exhibition. Of the 78 women who presented themselves for matriculation, 71 passed, 27 of them with honours. Speaking of the exhibitions founded by the Drapers' Company and the Irish Society for the promotion of education among women in Londonderry, the Vice-Chancellor says:—"It would be most useful that the example thus set should be followed by others. There are other Companies of the Corporation of London who also hold

property in the district of Londonderry. Surely they could not employ the income, which they hold as a public trust, in a more advantageous manner than in facilitating the education of deserving persons, hindered by straitened means from securing for themselves the benefits of higher education."

At the last examination of students of medicine at the Nicholas Hospital, in St. Petersburg, fifty-four ladies out of ninety-two obtained their degree.

The first Danish lady physician, Miss Nielsen, has just begun to practise at Copenhagen. She took her degree with the highest honours.

In a lucid and interesting article in the *Scotsman*, on "Temperature of the Western Lakes and Lochs," Dr. H. R. Mill sums up the results of various recent observations made by himself and by Mr. John Murray, of the *Challenger* Commission. The eastern fringe of the North Atlantic brings between the western islands water at a uniform temperature of 46° . An equal temperature prevails on the surface, except in the vicinity of land, where it is higher. In nearly land-locked sea lochs and basins the temperature of the mass of water is determined by the configuration, and varies from $47^{\circ}5$ to $43^{\circ}8$, according to certain definite laws. In fresh-water lakes, those that are shallow are at a temperature of about 45° ; those that are deep are colder, varying from 43° to 41° , and showing hardly any difference in temperature between surface and bottom.

On May 19, at 22h. 37m. (Greenwich time) a shock of earthquake was felt in the Alpes Vaudoises, at Sion, Bex, Aigle, Vevey, Rougemont, Gessenay, and other places. On May 20, 3 h. 5m., a slighter shock was felt at Rolle (Vaud).

On May 30, about 3 o'clock in the morning, heavy shocks of earthquake were felt at the city of Mexico. The earth tremor was of a violent kind, and had a lifting motion lasting five seconds. This was followed by a low roar and a strong vibration of the earth from east to west, lasting thirty-nine seconds. The houses rocked, and thousands of people left their beds. It was afterwards found that shocks of earthquake had been general in the States of Hidalgo, Mexico, Morelos, Puebla, Tlascala, Vera Cruz, and Oajaca. The force of the earthquake caused bells to ring and walls to crack. One of the aqueducts bringing water into the city of Mexico was damaged. On the same day a severe shock of earthquake occurred at Benton, Arizona, at noon, and at Nogales, Arizona, at 1 o'clock in the afternoon.

ACCORDING to a telegram from New York, dated May 31, shocks of earthquake have been felt in the islands of St. Lucia, St. Vincent, and Grenada.

A CYCLONE of unusual severity passed over the northern portion of the Bay of Bengal last week. The Calcutta Correspondent of the *Times* says that at the beginning of the week the Meteorological Department reported that a storm had formed near Diamond Island, and was slowly advancing towards the Madras coast. At first the storm appeared likely to strike land near Vizagapatam, but on Wednesday morning it took a more northerly direction, and during the following night passed between Saugor Island and False Point, and thence inland, *vid* Midnapore and Chota Nagpore. At Saugor Island the wind's rate was sixty-seven miles an hour, when the anemometer and storm signals were blown away. It is believed that the wind attained greater force later.

THE New England Meteorological Society has two special investigations on hand for the coming summer, in addition to its regular work of temperature and rainfall observation. The first special subject (which has been investigated during the last two summers) is thunder-storms in New England; the second is the

sea-breeze on the eastern coast of Massachusetts, now undertaken for the first time. The Society would be unable to carry on these inquiries but for the aid received from the U.S. Signal Service, the Bache Fund of the National Academy, and the Harvard College Observatory.

GENERAL GREELY, the new Chief Signal Officer of the United States, has made a laudable effort to publish the Monthly Weather Review as nearly as possible up to time. The Reviews for January and February last have lately been issued—leaving some six months of arrears to be worked up subsequently. If these Reviews are published regularly, and quickly, the current information contained in them will be of much value, as they give not only complete data for the whole of the United States and Canada, but also details of the storms, ice, and fog in the Atlantic Ocean. The Reviews in question are accompanied by a number of very clear charts, one of which shows the tracks of the areas of low pressure over the ocean in each month, and the appendices contain particulars of miscellaneous phenomena and various notes. Among the latter may be specially mentioned articles on sunspots and meteorological phenomena, and results of anemometer observations at sea, with a description of a graphical method for deducing the true velocity of the wind from the records of the instrument and the motion of the vessel.

THE Oficina Meteorológica Argentina has just published vol. v. of its *Anales* (620 pp. 4to, Buenos Aires, 1887), containing the monthly and yearly results of observations made at various stations during the year 1884, together with exhaustive articles on the climate of four places in the Republic, based on observations taken between the years 1855 and 1886. This service, which is undoubtedly the most completely organized of any existing in the South American States, is now under the superintendence of Mr. W. G. Davis, who has succeeded Dr. B. A. Gould, the former Director. A new meteorological observatory is being built at Córdoba, and will be furnished with the best self-recording instruments—the astronomical observatory, with which it has been hitherto connected, being made a separate institution. Several new stations have been recently established in remote places, including an important one on Stat n Island ($54^{\circ}55'$ south latitude). The service is under the Ministry of Public Instruction.

At a recent meeting of the Canadian Institute, Dr. Rosebrugh, of Toronto, read a paper on and presented some specimens of the photography of the interior of the living eye. Two series of photographs were shown. The first simply presented views of the optic nerve and retinal blood-vessels. The second series showed not only the retina of the eye, but also an inverted picture of objects to which the eye was directed, depicted upon the retina.

A PHOTOGRAPHER at Pesth has succeeded in taking photographs of projectiles, fired from a Werendler gun, whilst having a velocity of 1300 feet per second. The projectiles appeared on the impressions enveloped in a layer of air hyperbolic in form.

IN a recent communication to the Russian Geographical Society, M. Krasnoff has described the formation, at the present time, of loess from the glacial gravelly clay in the Tian-Shan. The rains which wash this clay take away its finest dust, which is deposited in layers, but accumulates slowly on account of the small amount of rain. M. Krasnoff supposes with much probability that the yellow loess of China originated in this way. As to the flora of the Tian-Shan, M. Krasnoff points out that it formerly held a place between that of the Altai and that of the Alps, and resembled the present vegetation of the Caucasus. The desiccation of the country caused the retreat of the glaciers,

the formation of the debris-covering on the mountain slopes, and the decrease of the lakes. The loess was deposited, and, as desiccation proceeded, the stony and sandy steppes by and by made their appearance. The process of desiccation went on first on the southern slopes of the mountains, where the dry steppe now rises to the limits of perennial snow. With the exception of a few species which accommodated themselves to the new conditions, all plants of an Alpine character and those that grow in moist climates disappeared, as also did the forest vegetation on the dry slopes of the hills. The place of the old flora was taken by immigrants from the drier parts of Asia.

THE death is announced, at the age of seventy-six, of the Swedish botanist, Prof. J. E. Areschoug. His best-known works are "Symbola Algarum Floræ Scandinaviæ," "Iconographia Phycologia," and "Phyceæ Marinæ."

THE Norwegian Storting has granted £100 to Herr Dahll, to enable him to issue a short popular scientific work on the geology of Northern Norway. The Assembly has, however, refused at present to grant £450 to Prof. W. C. Brögger, who is anxious to complete a work which he has had in hand for several years on the syenite and granite rocks of the mountains around the Christiania fjord.

PERSONS interested in the fisheries of Sweden have often urged that oyster-beds should be formed on the south-west coast of the country, similar to those which have been so successful on the opposite coast of Norway. This is now being done by a Swedish naval captain, Mülenfels, who is founding two oyster beds on the coast of the province of Bohus. The young oysters to be laid down will be taken from the bed at Öster-Risör, in Norway. The oysters cultivated there are said to equal "natives" in flavour.

ON May 11 the American Oriental Association held its spring meeting in Boston. The number of papers read at the meeting was unusually large. The paper which seems to have attracted most attention was one by Dr. W. Hayes Ward, who offered a new interpretation of a scene presented on a number of Babylonian seals. The late Mr. George Smith thought the design represented the Tower of Babel. Others have held that it is a representation of the underworld opening to receive the dead, and of a porter leading the soul into the presence of a deity. Dr. Ward's theory is that certain prominences invariably found on the seals stand for mountains, as they undoubtedly do in Assyrian art, and that the deity surrounded by rays is the sun-god Shamash. During the night he has been under the earth, and in the morning the porter opens the gate to let him out. In the discussion which followed the reading of the paper, Prof. Lyon, of Harvard College, and Prof. Jastrow, of the University of Pennsylvania, took part; and some evidence was brought forward to show that Dr. Ward's ideas are confirmed by references to sunrise in cuneiform texts.

A FINE series of new colouring-matters has recently been discovered by Dr. J. H. Ziegler (*Berichte der Deut. Chem. Ges.*, No. 8, 1887), by employment of the hydrazine reaction upon amido-derivatives of triphenylmethane. Rosaniline hydrochloride was first converted by nitrous acid into its diazo-derivative, which was then reduced with tin and hydrochloric acid, yielding brilliant green crystals of a hydrazine salt. This new hydrazine, which, in contradistinction to rosaniline, the discoverer terms roshydrazine, is itself a colouring-matter of a somewhat bluer shade than fuchsin, and forms the nucleus of the series. By treatment with aldehyde, acetone, or benzophenone, condensation products are obtained possessing brilliant colours, varying from red to violet; benzaldehyde and aceto-acetic ether, on the other hand, yield beautiful blues, while grape-sugar forms with roshydrazine a dye of a greenish-blue tint. Very numerous

shades are further produced by action of many other reagents, and, moreover, the sulpho-derivative of roshydrazine appears to form a second series of coloured substances quite as numerous as those of the nucleus itself. Indeed, the discovery will, in all likelihood, prove a very rich one, and will afford another instance of the immense assistance which pure chemistry so frequently furnishes to the commercial world. The fact of most vital importance about these new colours, which are practically insoluble in water, is that they may be readily prepared *in situ* upon the fibre, it being only necessary to immerse it first in a bath of roshydrazine, and afterwards in a second bath containing the condensing reagent.

MESSRS. LONGMANS are preparing for publication "Modern Theories of Chemistry," by Prof. Lothar Meyer, translated from the fifth edition of the German by Prof. P. Bedson and Prof. W. C. Williams; "Electricity for Public Schools and Colleges," by W. Larden; "A Text-book of Elementary Biology," by Prof. R. I. H. Gibson; "The Testing of Materials of Construction," by W. C. Unwin, F.R.S.; and "Astronomical Work for Amateurs: a Practical Manual of Telescopic Research adapted to Moderate Instruments," edited by I. A. W. Oliver, with the assistance of Messrs. Maunder, Grubb, Gore, Denning, and others.

MANY of the beautiful Alpine flowers, especially the edelweiss and the Alpine rose, are in danger of becoming extinct. The Government of Valais and the Monte Rosa section of the Alpine Club, have caused gardens to be laid out and inclosures to be made for the cultivation and protection of these plants. The station on the Tête de Mouton, near Vissocye, in the Einfeicht Valley (Valais), situated at the height of 2300 metres, cultivates not only plants belonging to the Alps, but some from the Pyrenees, the Himalayas, and the Caucasus.

IN the Report of the Rugby School Natural History Society for 1886, just issued, the editors are able to congratulate the Society on the number of its members and associates being greater than in any previous year. Among the contributions printed with the Report are papers on the motion of stars in line of sight, the dispersion of seeds and spores, Danes' Blood, and the protective colouring and form of animals.

THE Grand Duke Nicholas of Russia, eldest son of the Grand Duke Michael Nicholaievitch, has, it is said, written a book on the entomology of the Caucasus. His Highness is an ardent student of natural history, and studies every new work on the subject published in England, France, and Germany.

AT a recent meeting of the Natural History Society of Wisconsin, Dr. Peckham, the President, read an interesting paper on wasps, presenting the results of many experiments made in 1886 on the mental habits and peculiarities of these insects. In the section entitled "Emotions," Dr. Peckham discusses the question whether wasps have much sympathy with the suffering of their fellows. "To be sure," he says, "when we caught numbers of them, and painted them within the cage, they at once went to work to clean each other, and this seems to show that they have some desire to aid and comfort their friends. But we have often seen them continue to eat, with entire composure, near the body of one of their number that had just been crushed to death; and they frequently fall upon a dead relative, cut it up, and carry it into the nest to feed their young. An overpowering sense of utility is probably the cause of this cannibal propensity; as was the case in Tierra del Fuego where the natives were frequently forced, through stress of weather and scanty food-supply, to eat their old women."

IN the number dated April 19, *Science* publishes an excellent ethnographic map, by Mr. A. S. Gatschet, representing the linguistic families of the Indian dialects in the south-eastern parts of the United States, so far as they can be traced by the study of actual remnants of tribes still lingering in or near their old haunts, and by historic research. Of all the families represented on the map, the Maskóki were at one time most important. It is said that in former times the tribes of this family extended from the Atlantic to the country beyond the Mississippi, and from the Appalachian Range to the Gulf of Mexico. The majority of the Maskóki tribes now live in the eastern parts of the Indian Territory.

PROF. G. POUCHET has recently published a long and interesting paper concerning the life and work of Ch. Robin, the late Professor of Histology in the Paris Medical School. A complete list of Robin's works adds greatly to the value of the paper.

THE fourth number of the *Annales de l'Institut Pasteur* contains many interesting papers, among which are one by Duclaux, on the general biological phenomena of micro-organisms, and one by Bardach, Perronito, and Carita, on the presence of the *Bacillus* of rabies in milk.

AN explosion of natural gas, which had leaked from pipes and mixed with the atmosphere, took place lately at Youngstown, Ohio. The result was a fire, which burned down a church and a large number of new buildings. The cause of ignition was the lantern of a watchman, who narrowly escaped death. The use of natural gas as an illuminant and fuel is attended by considerable danger, because, being inodorous, it may leak without anyone noticing the fact until a disaster occurs.

IN a pamphlet issued lately by the U.S. Hydrographic Office, Lieut. Underwood says that mineral oils are not so effective for use at sea as vegetable or animal. A comparatively small amount of the right kind of oil, say two quarts per hour, properly used, is sufficient, he asserts, to prevent much damage, both to vessels and to small boats, in heavy seas. The greatest result from oil is obtained in deep water. In a surf, or where water is breaking on a bar, the effect is not so certain; but, even in this case, oil may be of benefit, and its use is recommended by Lieut. Underwood. He advises that, when an attempt is about to be made to board a wreck, the approaching vessel should use the oil after running as close as possible under the lee of the wreck. The wreck will soon drift into the oil, and then a boat may be sent alongside of her.

ACCORDING to an official notification of the Trustees of the Schwestern Fröhlich Stiftung, at Vienna, certain donations and pensions will be granted from the funds of this charity this year, in accordance with the will of the testatrix, Miss Anna Fröhlich, to deserving persons of talent who have distinguished themselves in any of the branches of science, art, or literature, and who may be in want of pecuniary support either through accident, illness, or infirmity consequent upon old age. The grant of such aid is primarily intended for Austrian subjects; but foreigners of every nationality, if resident in Austria, may benefit by the Trust. Austrian subjects residing in England may also make application for a grant. Applications addressed to the Trustees (das Curatorium) must be transmitted to the President's office of the Common Council of the City of Vienna (an das Präsidial-Bureau des Wiener Gemeinderathes Neues Rathhaus) before August 31, 1887, through the Austro-Hungarian Embassy in London, 18 Belgrave Square, S.W., where particulars as to terms and conditions may be obtained.

THE Gold and Silver Commissioners have requested Mr. Henry Dunning Macleod to investigate the relation between money and prices.

IN Mr. Abercromby's article last week on equatorial wind currents and Krakatō dust, the end of the last paragraph but two (p. 87) should read thus—"and though the highest currents over the Polar limit of both the south-east and north-east trades are from north-west and south-west [not south-east] respectively," &c.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus rhesus* ♂) from India, presented by Mrs. C. J. Fisher; a Bonnet Monkey (*Macacus sinicus* ♂) from India, presented by Mrs. Yeates; a Lesser White-nosed Monkey (*Cercopithecus petaurista*) from West Africa, presented by Mr. T. H. Kenyon, R.N.; a Brown Bear (*Ursus arctos*) from Northern Europe, presented by Mr. John Rhind; a Common Squirrel (*Sciurus vulgaris*), British, presented by Miss Muriel Reed; a Blyth's Tragopan (*Cerionis blythii*) from Upper Assam, presented by Mr. W. Brydon; a King Vulture (*Gypagus papa*) from Tropical America, presented by Mr. W. Allen Sumner; two Little Guans (*Ortalis motmot*) from Guiana, presented by Mr. W. Thomson; six European Tree Frogs (*Hyla arborea*), European, presented by Mr. E. Wroughton; a Larger Hill Mynah (*Gracula intermedia*) from Northern India, four Tuatera Lizards (*Sphenodon punctatus*) from New Zealand, deposited; a Patagonian Conure (*Conurus patagonus*) from La Plata, two Dark-green Snakes (*Zamenis atrovirens*) from Dalmatia, four Axolotls (*Siredon mexicanus*) from Mexico, purchased; a Common Rhea (*Rhea americana*) from South America, received in exchange; a Molucca Deer (*Cervus moluccensis*); a Japanese Deer (*Cervus sika*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE PARIS OBSERVATORY.—We have received Admiral Mouchez's Report for the year 1886, which was presented to the Council of the Observatory on February 4, 1887. Admiral Mouchez first refers to M. Loewy's proposed new methods for determination of the constant of refraction and of the constant of aberration, the principles of which have already been explained in this column. With regard to refraction, it is pointed out that the exact determination of its amount at different altitudes and under varying conditions is of peculiar interest for an Observatory situated as that of Paris is, on the southern borders of a large city, so that the temperature of the strata of air to the north and to the south will probably differ considerably. M. Mouchez hopes that during the current year it will be possible to attack these fundamental problems with an instrument constructed on M. Loewy's plan. The great meridian instrument and the Gambey circle have been actively employed during the year, a grand total of 16,505 observations having been obtained, 798 of which refer to planets, including 148 of the sun and 128 of the moon. The principal meridian work continues, as in recent years, to be the re-observation of Lalande's stars. The equatorials have been employed in the observations of comets, minor planets, nebulae, eclipses of Jupiter's satellites, and occultations. It is almost unnecessary to remind our readers of the magnificent work in astronomical photography which has been carried on by the MM. Henry, and which embraces planets and their satellites (Hyperion has been photographed with an exposure of thirty-five minutes), the moon and stars, including clusters and double-stars. M. Mouchez reports that he is considering how the stellar photographs may be most conveniently utilized for the formation of a catalogue, and states that, before final decision, he awaits the results of the then approaching meeting of the Astronomical Congress. The macro-micrometer devised by MM. Henry for measuring the relative positions of stars on the photographic plates is described in detail, and some results of double-star measurements made with this instrument are appended. It appears that these are of considerable accuracy, the mean error of a single measure for the double-star ζ Ursæ Majoris being 0".077 in distance and 0".55 in position-angle.